



What is a Warehouse Management System?

This article explains what a warehouse management system (WMS) is, how a WMS works, the different parts of a WMS, and the benefits to a distributor of implementing a WMS.

A warehouse management system is a group of computer programs designed to help a distributor perform warehouse operations more quickly and consistently with fewer errors. This article only addresses warehouse management systems that employ wireless technology (RF or wireless network based).

Warehouse management systems can range in complexity from very basic tools to assist warehouse employees in performing daily operations to highly sophisticated systems that replace the warehouse workers entirely. Many Fortune 500 companies have spent millions of dollars automating warehouse operations with great success and impressive returns on investment. This article addresses the more basic, off-the-shelf variety of WMS.

There are two key elements of WMS operation:

1. Warehouse employees (operators) use portable computer terminals to record work performed in real time. The key here is in real time. The activity performed by an operator is recorded by the computer immediately, not written on paper and recorded in the computer later. The portable terminal is connected to the host computer just like any other workstation. The terminal could be RF (radio frequency) or a Palm Pilot like device operating over a wireless network.
2. Bar codes are used to reduce the amount of information an operator must enter directly into the terminal. Each portable computer terminal contains a scanner similar to the scanner used at a food store check-out. Operators scan labels that contain a bar coded representation of bin numbers, item numbers, lot numbers, quantities, and more whenever possible to eliminate keystrokes.

Employing barcode technology in real time allows the computer to validate the work being performed by the operator, gives the operator positive confirmation as the task progresses, and gives the operator immediate feedback when an error occurs. These two key elements of WMS operation help to eliminate data transcription errors, picking the wrong items to fulfill orders, and the need for checking work by a second person.

Why invest in a WMS? The most common reasons distributors invest in a WMS are to improve customer service and/or to improve resource utilization (inventory, buildings, and people). A WMS helps improve customer service and resource utilization by eliminating errors. The result of eliminating errors can be measured by

1. Inventory accuracy – greater than 99% at the item and bin level (How to attain 99% + inventory accuracy is the topic of another article)



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2. Zero returns due to warehouse errors
3. Checking operations are eliminated
4. Improved order shipment completion
5. Shortened order lead time and improved on-time delivery performance

A lot of labor is saved by people not looking for misplaced or lost inventory and double checking processes. Accurate inventory also directly impacts shipment completion and eliminates the expediting that occurs when inventory that was promised to a customer is not available. The wireless picking process is faster and helps with order shipment accuracy which leads to eliminating shipping errors. Taking labor out of the picking and shipping process leads to a shorter order lead time. How space utilization is improved is described in the next section.

At the most basic level the WMS is used to record operator activity (e.g. inventory placement, inventory picked for a sales order, or inventory movement). The operator is assigned a task to be performed by the supervisor. The operator records the task results in the portable terminal. A WMS with more advanced capabilities can define tasks, plan and prioritize tasks, assign tasks to operators, and guide the operators to perform assigned tasks. Different tasks could be performed at each level within the same warehouse. This is discussed in more detail below.

The most common capabilities of a WMS include:

1. Receiving inventory
 - a. The operator records the receipt of goods against a purchase order, transfer order, customer return authorization, or a kitting or production work order in the simplest form of receiving
 - b. More advanced capabilities include receiving against a packing list or advanced ship notice and receiving by container
 - c. The objective is to record the receipt of goods accurately
2. Locating inventory (often referred to as putaway)
 - a. This is the process of moving received inventory from the dock, kitting, or production department to a storage bin
 - b. The simplest form of putaway is called user directed putaway where the operator determines where to place the inventory and uses the portable terminal to record the movement
 - c. A more advanced form of putaway is called system directed putaway where the WMS determines the bin in which the inventory is to be stored and directs the operator to place the inventory in the assigned bin – there are several different methods for assigning storage bins that will be discussed in a subsequent article
 - d. Using system directed putaway along with inventory allocation as described next can lead to significant space savings when the system is configured properly. A



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- lot of setup is required, but space utilization improvements of 25% or more are not unheard of
3. Inventory allocation
 - a. This is the process of determining the bin from which inventory is to be picked to satisfy a demand
 - b. At the most basic level the operator performs inventory allocation by choosing the bin from which to pick inventory from a list of available bins shown on a pick list
 - c. The WMS performs inventory allocation when an order is released for picking
 - d. There are many different methods of inventory allocation – these will be addressed in a subsequent article
 4. Picking inventory to satisfy sales, transfer, kitting, or production/rework orders
 - a. In the simplest approach the operator uses a printed pick list and records the results on the portable terminal
 - b. There are quite a variety of picking methods including pick by order, wave picking, pick and pass, and batch picking – these will be discussed in a subsequent article
 5. Replenishment
 - a. This is the process of refilling forward pick bins (sometimes called dedicated or primary bins) for an item from reserve inventory
 - b. This is a more advanced feature and will be discussed in a subsequent article
 6. Shipping confirmation
 - a. This function is often left in the enterprise software at the most basic level
 - b. Can be performed within the WMS or performed by special shipping software that operates along with the WMS or a combination of both
 - c. This will be discussed in more detail in a subsequent article
 7. Cycle counting and physical inventory
 - a. In the most basic form the operator counts inventory and records the results using the portable terminal
 - b. More advanced systems determine the number of counts that need to be performed each day, determine which items to count each day, assign items to count to a queue, and guide the operator around the warehouse in an efficient manner to perform the counts
 - c. There are a variety of methods used to determine which items to count when – see the *Why Cycle Count* article for more information
 8. Warehouse operations such as relocating inventory and recording inventory gains and losses (adjustments) – an operator generally performs these activities as required and records the results using a portable terminal

Contact: Bill Muehlbauer
Office (920) 922-7499
Cell (858) 204-4127